

CLAIMS

What is claimed is:

1. A multiple-speed ratio automatic transmission for an automotive vehicle, comprising:

- an input;
- an output;

- a planetary gear system comprising first, second and third planetary gear units, each gear unit having a sun gear, a ring gear, planet pinions meshing with the sun gear and planet pinions meshing with the ring gear, and a carrier rotatably supporting the planet pinions, the input being driveably connected to the sun gear of the first gear unit, the output being driveably connected to the carrier of the third gear unit, the ring gear of the second gear unit being driveably connected to the carrier of the third gear unit, one of the carrier of the first gear unit and the ring gear of the first gear unit being secured against rotation, the carrier of the second gear unit being driveably connected to ring gear of the third gear unit;

- a first brake for holding against rotation and releasing the sun gear of the second gear unit;

- a second brake for holding against rotation and releasing the carrier of the second gear unit and ring gear of the third gear unit;

- a first clutch for driveably connecting and disconnecting the input and sun gear of the third gear unit;

- a second clutch for driveably connecting and disconnecting the input and carrier of the second gear unit;

- and

- a third clutch for releasably driveably connecting the other of the carrier and the ring gear of the first gear unit to the sun gear of the second gear unit.

2. The transmission of claim 1, wherein the second brake means comprises:

a friction brake having a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, a second element secured against rotation, the first element and second element adapted to engage mutually thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for free rotation.

3. The transmission of claim 1, wherein the second brake means comprises:

a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, a second element secured against rotation, the first element and second element adapted to engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage, thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for free rotation; and

an overrunning coupling including a third element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a fourth element secured against rotation, and a fifth element located between the third element and fourth element for producing a one-way drive connection between the third element and fourth element.

4. The transmission of claim 1, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

a friction brake having a first element driveably connected to the carrier of the second gear unit and the ring

gear of the third gear unit, and a second element driveable connected to the transmission case; and

an overrunning coupling arranged in parallel drive relationship with the friction brake clutch, for producing a one-way drive connection between the carrier of the second gear unit and the transmission case and the ring gear of the third gear unit.

5. The transmission of claim 1, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

a friction brake having a first element driveably connected to the carrier of the second gear unit and the ring gear of the third gear unit, and a second element driveable connected to the transmission case.

6. The transmission of claim 1, further comprising:

a torque converter including an impeller driveably connected to a power source, and a turbine hydrokinetically coupled to the impeller and driveably connected to the input shaft.

7. A multiple-speed ratio automatic transmission for an automotive vehicle, comprising:

an input;
an output;

a planetary gear system comprising first, second and third planetary gear units, each gear unit having a sun gear, a ring gear, planet pinions meshing with the sun gear and ring gear, and a carrier rotatably supporting the planet pinions, the input being driveably connected to the sun gear of the first gear unit, the output being driveably connected to the carrier of the third gear unit, the ring gear of the second gear unit being driveably connected to the carrier of the third gear unit, the ring gear of the first gear unit being

secured against rotation, the carrier of the second gear unit and ring gear of the third gear unit being mutually driveably connected;

5 a first brake for holding against rotation and releasing the sun gear of the second gear unit;

a second brake for holding against rotation and releasing the carrier of the second gear unit and ring gear of the third gear unit;

10 a first clutch for driveably connecting and disconnecting the input and sun gear of the third gear unit;

a second clutch for driveably connecting and disconnecting the input and carrier of the second gear unit; and

15 a third clutch for releasably driveably connecting the carrier of the first gear unit to the sun gear of the second gear unit.

8. The transmission of claim 7, wherein the second brake means comprises:

20 a friction brake having a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, a second element secured against rotation, the first element and second element adapted to engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against
25 rotation, and to disengage, thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for free rotation.

30 9. The transmission of claim 7, wherein the second brake means comprises:

a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, a second element secured against
35 rotation, the first element and second element adapted to

engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage, thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for
5 free rotation; and

an overrunning coupling including a third element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a fourth element secured against rotation, and a fifth element located between the
10 third element and fourth element for producing a one-way drive connection between the third element and fourth element.

10. The transmission of claim 7, further comprising a transmission case fixed against rotation, and wherein the
15 second brake further comprises:

a friction brake having a first element driveably connected to the carrier of the second gear unit and the ring gear of the third gear unit, and a second element driveable connected to the transmission case; and

20 an overrunning coupling arranged in parallel drive relationship with the friction brake clutch, for producing a one-way drive connection between the carrier of the second gear unit and the transmission case and the ring gear of the third gear unit.

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11. The transmission of claim 7, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

a friction brake having a first element driveably
30 connected to the carrier of the second gear unit and the ring gear of the third gear unit, and a second element driveable connected to the transmission case.

12. The transmission of claim 7, further comprising: a
35 torque converter including an impeller driveably connected to

a power source, and a turbine hydrokinetically coupled to the impeller and driveably connected to the input shaft.

13. A multiple-speed ratio automatic transmission for an automotive vehicle, comprising:

an input;

an output;

a planetary gear system comprising a first compound planetary gear unit, second and third simple planetary gear units, each gear unit having a sun gear, a ring gear, planet pinions meshing with the sun gear and with the ring gear, and a carrier rotatably supporting the planet pinions, the input being driveably connected to the sun gear of the first gear unit, the output being driveably connected to the carrier of the third gear unit, the ring gear of the second gear unit being driveably connected to the carrier of the third gear unit, the carrier of the first gear unit being secured against rotation, the carrier of the second gear unit being driveably connected to the ring gear of the third gear unit;

a first brake for holding against rotation and releasing the sun gear of the second gear unit;

a second brake for holding against rotation and releasing the carrier of the second gear unit and ring gear of the third gear unit;

a first clutch for driveably connecting and disconnecting the input and sun gear of the third gear unit;

a second clutch for driveably connecting and disconnecting the input and carrier of the second gear unit; and

a third clutch for releasably driveably connecting the ring gear of the first gear unit to the sun gear of the second gear unit.

14. The transmission of claim 13, wherein the second brake means comprises:

a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, a second element secured against rotation, the first element and second element adapted to engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage, thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for free rotation.

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15. The transmission of claim 13, wherein the second brake means comprises:

a friction brake including a first element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, a second element secured against rotation, the first element and second element adapted to engage mutually, thereby holding the carrier of the second gear unit and ring gear of the third gear unit against rotation, and to disengage, thereby releasing the carrier of the second gear unit and ring gear of the third gear unit for free rotation; and

an overrunning coupling including a third element driveably connected to the carrier of the second gear unit and ring gear of the third gear unit, and a fourth element secured against rotation, and a fifth element located between the third element and fourth element for producing a one-way drive connection between the third element and fourth element.

16. The transmission of claim 13, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

a friction brake having a first element driveably connected to the carrier of the second gear unit and the ring gear of the third gear unit, and a second element driveable connected to the transmission case; and

an overrunning coupling arranged in parallel drive relationship with the friction brake clutch, for producing a one-way drive connection between the carrier of the second gear unit and the transmission case and the ring gear of the third gear unit.

17. The transmission of claim 13, further comprising a transmission case fixed against rotation, and wherein the second brake further comprises:

10 a friction brake having a first element driveably connected to the carrier of the second gear unit and the ring gear of the third gear unit, and a second element driveable connected to the transmission case.

15 18. The transmission of claim 13, further comprising: a torque converter including an impeller driveably connected to a power source, and a turbine hydrokinetically coupled to the impeller and driveably connected to the input shaft.